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A new test site in Aosta Valley (northwestern Italian Alps) for measuring the effects of snow-gliding on avalanche defence structures

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In the past the attention has been mainly posed over extreme avalanche events, which can destroy villages and infrastructures and modify the landscape; scientists tried to understand their dynamics and potential destructive effects. The catastrophic event of December 15th, 2008 in Valsavarenche (Italy) caused the collapse or the damage of ten houses in Les Thoules village. Following that, 2.60 km of snow umbrellas (distributed over ten rows) were installed in the avalanche release zone named Plan de La Tour. Each element of this kind of defence structure is made by a mast anchored to the ground through a single point. To hold the snowpack, a steel cross with a fastened net, is hinged to the mast.

Within the Operational programme 'Italy - France (Alps - ALCOTRA)'Project "RiskNat – Gestione in sicurezza dei territori di montagna transfrontalieri" a test site to measure the snow-gliding and the snowpack pressure on defence structures has been realized.

The test site "Plan de la Tour" is located in Aosta Valley (North-western Italian Alps) within the Gran Paradiso National Park on the Gran Paradiso Massif. The site is at 2550 m ASL and it is characterised by a slope angle between 28° and 45°. Installed in October 2010, the instrumentation is located in the upper part of the release zone.

In order to measure the snow-gliding two couples of snow-shoes connected to related specific snow-gliding sensors were placed: a couple within the area covered by snow umbrellas and another outside it. The system is supplied by a high energy battery. Also data-loggers measuring the temperature at the snow/soil interface were placed closed to each couple. The data are registered continuously every 30 minutes. On the other hand, the measurements of the pressure caused by the snow-gliding on the defence structures are performed by monitoring the deformation of one of the cross beams composing the snow umbrella and the overall force on the foundation. Eight strain transducers were installed on a beam of the retaining structure in order to evaluate the curvature under the snow load. In addition, strain gauges were directly stuck on both the plates constituting the link between the mast and the foundation rod. Power supply is given by a nearby solar panel and the acquisition system is composed by a programmable device which records the strain every 30 minutes.

The combination of snow-gliding data with snow pressure measurements might help to understand the behaviour of snow umbrellas in avalanche release areas.

Due to the fact that the site is inaccessible during winter, the first data will be available in Spring 2011.

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